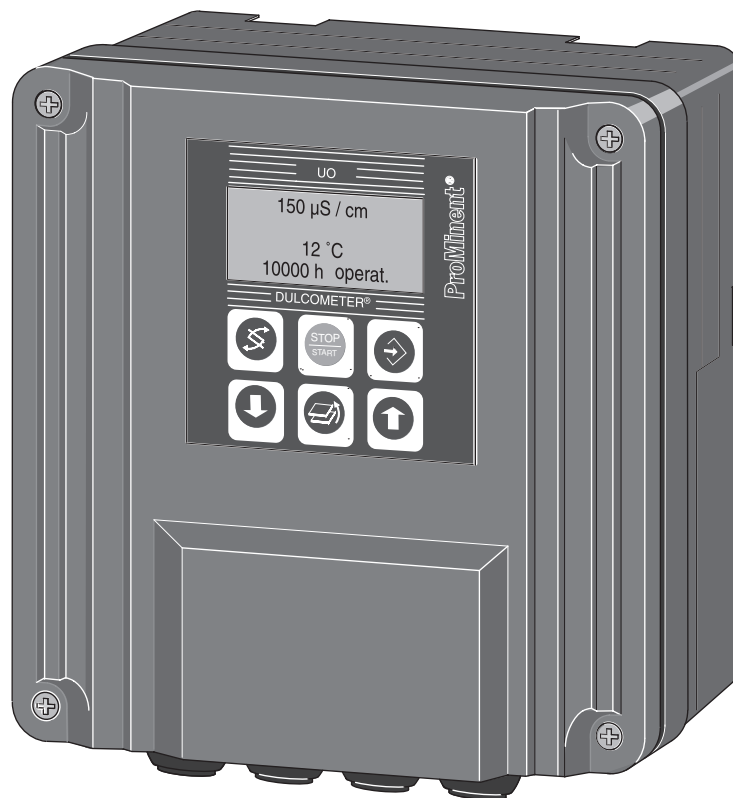


Operating Instructions

Dulcosmose® Controller



Please affix device label here!

**Please read the operating instructions through completely before commissioning this equipment!
Do not discard! Any part which has been subject to misuse is excluded from the warranty!**

Publishing details:

Operating Instructions Manual
Dulcosmose® Controller
© ProMinent Dosiertechnik GmbH, 1999

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Subject to technical alterations.

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Instructions for Use

This operating instructions manual includes product descriptions in

main text,

- enumerated points
- ▶ highlighted points

and safety guidelines indicated with symbols:



WARNING

Could result in loss of life or serious injury if safety guidelines are not observed.



CAUTION

Could result in lesser injuries or damage to property if safety guidelines are not observed.



ATTENTION

Could result in damage to property if safety guidelines are not observed.

NOTE

Working guidelines.

1 Application

The Dulcosmose® Controller is a microprocessor-controlled measurement and control device for the control of a Dulcosmose® reverse osmosis system (abbreviated: Dulcosmose® system). The device can be wall or panel mounted.

The controller is available in 24 VAC or 230 VAC versions:

- Dulcosmose®-Controller 230 VAC version Order number 1004192
- Dulcosmose®-Controller 24 VAC version Order number 1005082

The reverse osmosis controller ensures the continuous operation of the Dulcosmose® system and automatic filling of the permeate storage tank.

The continuous monitoring of the permeate conductivity and the rejection of the first permeate ensure that the permeate which reaches the user is of the required quality.

The integrated flushing functions ensure a long operating life for the membrane elements in the Dulcosmose® system.

The system supports chemical cleaning of the membrane elements, which is required at regular intervals.

2 Function

ATTENTION



Depending upon the design of the Dulcosmose® system it is possible that some of the following functions do not apply.

In manual operating mode the Dulcosmose® system starts to run as soon as it is switched on. It can be switched off by pressing the START/STOP key.

The liquid level-controlled operating version incorporates two float switches and supports automatic filling of a permeate storage tank. The system starts up when the permeate level in the permeate storage tank falls below the minimum level. The Dulcosmose® system switches off if the upper level is reached during automatic filling of the storage tank. The system can be stopped externally via the pause contact.

System start-up flushing

The inlet valve opens when the system starts up. The raw water pressure is tested. If the raw water pressure is sufficient, the permeate valve (optional) and the flushing valve (optional) both open for system start-up flushing. If the raw water pressure is insufficient the system goes into failure mode. After a waiting period has elapsed, the raw water pressure is tested again. If, after a maximum number of tests, the raw water pressure is still too low, no further attempts are made.

After the flushing time has elapsed, the flushing valve closes. The booster pump starts up. The Dulcosmose® system now delivers permeate which is fed via the open permeate valve into the cleaning tank.

Permeate conductivity

The permeate conductivity is monitored. The system goes into failure mode if the permeate conductivity does not fall below the maximum permissible conductivity within the maximum free flushing time.

In systems which incorporate permeate flushing (optional), the cleaning tank is refilled after permeate conductivity has fallen to an admissible level. As soon as the permeate level in the cleaning tank has reached the upper float switch the permeate valve closes. The permeate then feeds into the storage tank or to the user. If the cleaning tank is not filled within the maximum filling time, the system goes into failure mode.

The permeate conductivity is also monitored during operation. If conductivity rises above the maximum level, the permeate is fed out of the system via the permeate valve (optional). If conductivity falls below the maximum level the permeate is used again. Otherwise the system goes into failure mode after the maximum free flushing time.

Raw water flushing (optional)

Raw water flushing is carried out at regular intervals during operation. For this purpose, the flushing valve opens briefly while the system is running. Any deposits that have built up, on the membrane for instance, are dissolved and flushed away.

If the system is switched off and/or switches off as a result of the permeate storage tank having filled, raw water flushing is carried out first. The booster pump is generally turned off during this process. The flushing valve and the permeate valve open. After the flushing time has elapsed the inlet valve closes. In certain cases it may be necessary to let the booster pump continue to run while raw water flushing is being carried out. In this case the booster pump is switched off once flushing has ended.

| | |
|-------------------------------------|--|
| <i>Permeate flushing (optional)</i> | Raw water flushing is followed by permeate flushing. The inlet valve closes. The cleaning pump starts up. After the flushing time has elapsed, all valves close. The cleaning pump is switched off. |
| <i>Intermittent flushing</i> | In order to prevent unacceptably long downtimes, the Dulcosmose® system starts automatically in levelcontrolled operation and from the mode “Pause” again after expiry of the maximum downtime for the interval operating mode. The permeate is fed out of the system if it exceeds the maximum permeate conductivity level or when the permeate storage tank is full. |
| <i>Chemical cleaning</i> | The controller supports the chemical cleaning of the reverse osmosis modules, which is required at regular intervals. Chemical cleaning is started after the cleaning tank has filled with cleaning solution. Chemical cleaning is switched off manually: all valves close and the cleaning pump switches off. |



ATTENTION

In addition to the operating instructions manual for the RO controller, always refer to the operating instructions and the technical description of the Dulcosmose® system.

3 Controller

Since electronics and software are constantly improving, the version number is included as a means of identification. This should be quoted in the event of any complaints and can be called up on the display.

The controller is delivered pre-set to factory settings. For many applications it is not necessary to change these settings.

NOTE

With the exceptions of “Setting of Cell-Constant Conductivity”, “Calibration of Conductivity Measurement” and “Changing of the Permeate Temperature for Temperature Compensation of the Conductivity Measurement”, changes in the settings can only be made when the Dulcosmose® system is switched off.

The operating hours counter will reset to zero after 32000 operating h.

3.1 Display

System information is displayed via a graphical display.

Operating Mode Displays the current operating mode. Flashing arrows and indicators signal warnings. Flashing failure messages indicate failures.

Programming mode Flashing display of adjustable numerical values and/or operating modes.

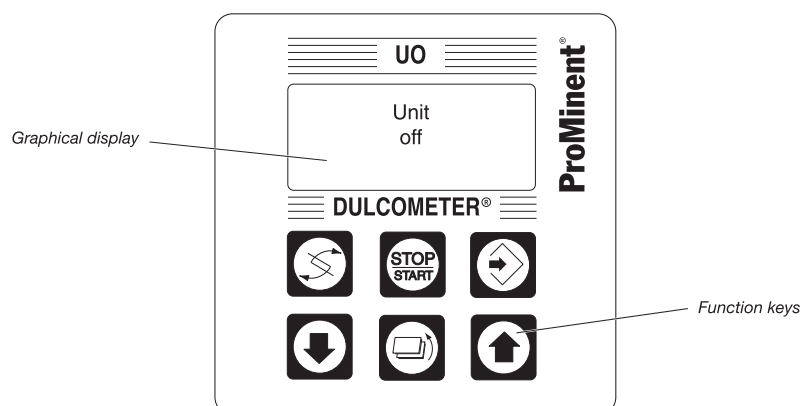


Fig. 1: Display and control unit

3.2 Function keys



START/STOP Switch the Dulcosmose® system on/off.
End chemical cleaning.

NOTE

Press the **START/STOP** key for at least two seconds.

NOTE

Pressing the **START/STOP** key during raw water and/or permeate flushing halts the flushing processes. The system switches off immediately.



CHANGE In operating mode: Change the display window.
In programming mode: Change variable parameters.



DOWN In programming mode: Reduce a displayed numerical value.
Change an operating mode.



UP In programming mode: Increase a displayed numerical value.
Change an operating mode.



BACK Exit the operating menu step by step through each display level.

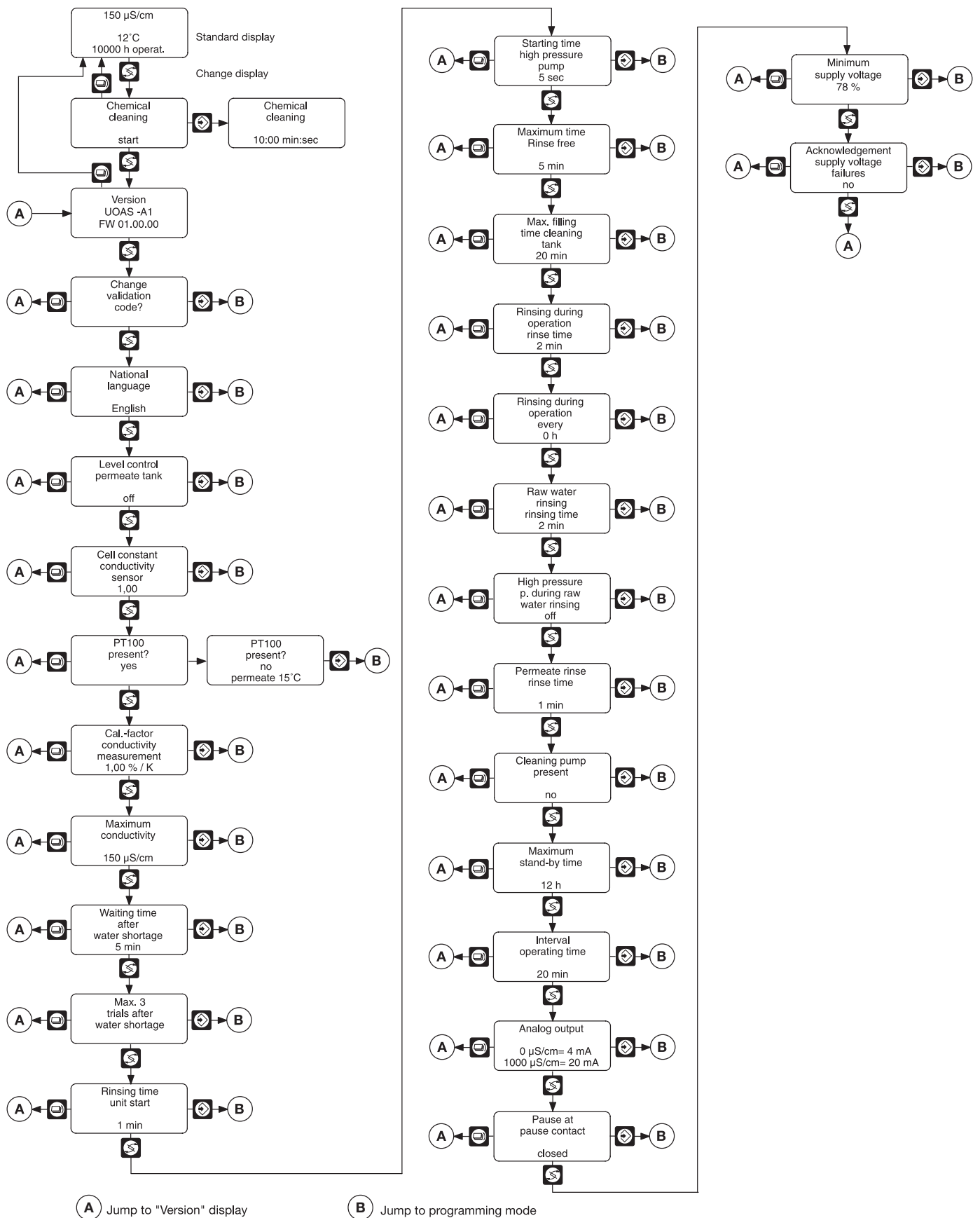


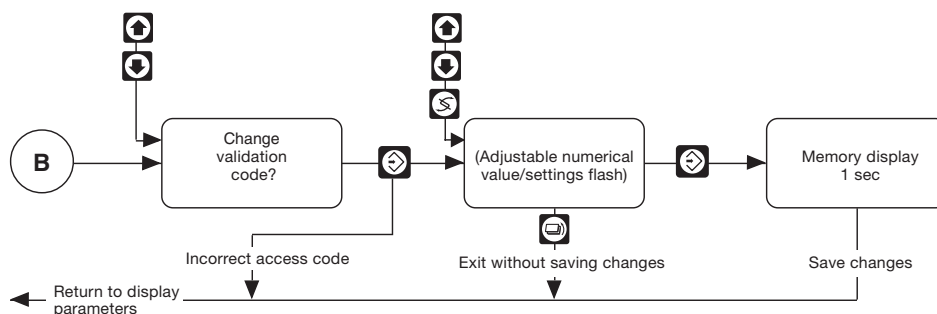
ENTER In operating mode: Change to programming mode.
Confirm a failure.
Start chemical cleaning.
In programming mode: Confirm a changed value or operating mode.

NOTE

After switching on the power supply, the controller starts in the “Unit off” mode or the last active operating mode. If either the external pause contact or “Permeate tank full” float switch is actuated when the system is switched on, the system starts in “Stand-by” mode.

3.3 Operating mode displays and parameter settings





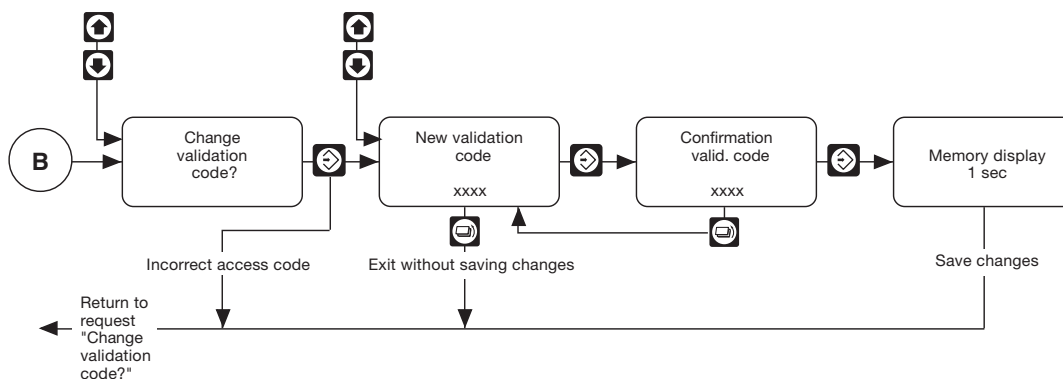
NOTE

Once the access code has been entered correctly there is no need to re-enter the code for subsequent programming activities. The flashing numerical values/settings appear as soon as the ENTER key is pressed.

Access will cease 5 minutes after the last keystroke and/or after pressing the back key.

3.3.1 Changing Access Code

To protect against unauthorised changes to the settings, the system controller permits access to the programming mode only if the correct access-code is entered. The user can reset this code. After the access code has been reset, programming mode cannot be accessed until the new access code has been entered.

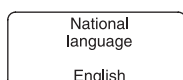


NOTE

Make a note of the access code! Parameter settings can be changed only if the correct access code has been entered.

The pre-set access code (5000) guarantees no protection against unauthorised settings/parameter changes.

3.3.2 Setting language



There are four languages to choose from:
German, English, French, Spanish.

3.3.3 Setting permeate tank level controller

Level control
permeate tank
off

*Liquid level control
operating mode*

Liquid level control with 2 level switches enables the automatic filling of a permeate storage tank.

If the liquid level control is activated, the Dulcosmose® system, after being switched on, starts to run once the permeate level on the permeate storage tank has fallen below the minimum level. If permeate reaches the upper level, the system switches off automatically.

Manual operating mode

In the manual operating mode the Dulcosmose® system runs immediately after being switched on and can be switched off using the START/STOP key.

3.3.4 Setting conductivity probe cell constant

Cell constant
conductivity
sensor
1,00

The cell constant of the conductivity sensor used must be entered. Entry is carried out in 0.01 increments. The cell constant can be adjusted during operation.

ATTENTION



An incorrect cell constant will result in an incorrect conductivity measurement.

3.3.5 Setting temperature configuration of conductivity sensor controller

PT100
present?
yes

PT100
present?
no
permeate 15°C

The conductivity is a temperature-dependant value. The controller offers two options for compensating for the effect of temperature on conductivity.

The simplest form of temperature compensation is carried out with the aid of a Pt 100 temperature gauge. If there is no temperature gauge present the permeate temperature can be entered manually. In this case the temperature will not appear in the standard display.

Cal.-factor
conductivity
measurement
1,00 % / K

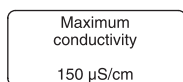
The compensation constant (C factor) can be selected. In most cases, the system is operated with a temperature compensation of 1 % / Kelvin. The compensation constant can be adapted during operation for the purpose of calibrating the conductance display.

ATTENTION



An incorrect compensation constant or temperature setting will result in an incorrect conductivity measurement.

3.3.6 Setting maximum conductivity



The monitoring of the conductivity, in conjunction with the permeate valve (optional), ensures that the permeate reaching the user conforms to the required conductivity.

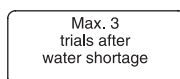
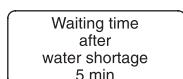
The system starts up with the permeate valve open. In systems that do not incorporate permeate flushing the permeate valve closes as soon as the permeate conductivity has fallen below the maximum conductivity level and the water is released to the user. In systems that incorporate permeate flushing, the permeate valve does not close until the cleaning tank has filled.

If the conductivity does not fall below maximal levels within the free flushing time the system will go into failure mode.

The permeate conductivity is also monitored while the system is in operation. If the permeate conductivity exceeds the maximum level, the permeate valve opens. As soon as the conductivity falls below the maximum level, the permeate valve closes. Otherwise the system goes into failure mode after the maximum free flushing time has elapsed. The permeate conductivity is not monitored during the flushing processes. The permeate valve opens.

The conductivity sensor is not monitored by the controller. If the sensor reading is "0 µS/cm" it should be inspected.

3.3.7 Setting waiting time and maximum number of attempts when water level is low



After switching on the Dulcosmose® system manually, or when water level has fallen below the lower level in the permeate storage tank, the inlet valve opens. The water pressure is tested. System start-up flushing is carried out if the water pressure is high enough.

Water pressure too low

If the water pressure is too low, the inlet valve closes once more. The system goes into failure mode. After the waiting time has elapsed the water pressure is tested again. If, after the maximum number of attempts, the water pressure is still too low, no further attempts are made.

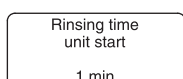
Water pressure fails

If the water pressure fails after the system flushing time has elapsed and during the start-up of the booster pump, the pump is switched off. A short time later a second attempt is made to start up the pump. If the water pressure fails once more the system goes into failure mode. No further attempts are made.

Water pressure drops

The water pressure is also monitored while the system is running. If the water pressure drops while the system is running, the system is immediately switched off. As described above, the water pressure is then tested several times and the system is started up again if the water pressure increases to a sufficient level. If, after the maximum number of attempts, the water pressure is still too low, no further attempts are made and the system goes into failure mode. The operating relay on the controller opens once the system goes into failure mode.

3.3.8 Setting system start-up flushing time - Purification pump present



At system start-up the inlet and (optional) flushing valves open but the booster pump remains switched off.

In systems in which water-hardness stabilisers are dosed, the system start-up flushing phase serves to ensure an even distribution of the metered chemicals in the raw water end of the Dulcosmose® system before the booster pump starts up.

In Dulcosmose® systems which are fitted with slow-opening motor-driven valves, the system start-up flushing phase also opens the valve fully before the pump starts to operate.

NOTE

The system start-up flushing time should be set so that, after the flushing phase has finished, the motorised valve is fully open and the metered chemicals are distributed throughout the whole system.

3.3.9 Setting start-up time for booster pump

Starting time
high pressure
pump
5 sec

The water pressure is not monitored during the pump start-up phase. A longer pump start-up phase is particularly necessary for larger systems in order to avoid incorrect shut-down due to supposed low water pressures during the pump start-up phase.

ATTENTION

If the start-up phase is too long the pump can become damaged. Refer to the pump operating instructions manual for precise information on start-up times.

3.3.10 Setting maximum free flushing time

Maximum time
Rinse free
5 min

If the permeate conductivity does not fall below the maximum conductivity within the maximum free flushing time, the Dulcosmose® system switches off and the system goes into failure mode.

3.3.11 Setting maximum filling time for cleaning tank

Max. filling
time cleaning
tank
20 min

Dulcosmose® systems with the “Permeate flushing” option have two float switches fitted in the cleaning tank. The contacts on the float switches close as the liquid levels rise. The upper float switch halts the filling process once the free flushing time has elapsed. After water has been drawn from the cleaning tank, it is automatically filled via the permeate valve the next time the Dulcosmose® system is started. The lower float switch serves to protect the cleaning pump from running when liquid levels are too low.

If the cleaning tank has not filled within the maximum filling time the Dulcosmose® system switches off and the system goes into failure mode.

3.3.12 Setting frequency and duration of raw water flushing during operation

Rinsing during
operation
rinse time
2 min

Rinsing during
operation
every
0 h

Raw water flushing is carried out at regular intervals while the Dulcosmose® system is running. For this purpose the flushing valve (optional) and the permeate valve open for the preset flushing period while the system is running. Any deposits that have built up, on the membrane for instance, are dissolved and flushed away.

This function is deactivated by setting the waiting time to “0 hours”. Raw water flushing while the system is running is always carried out by the booster pump.

3.3.13 Setting raw water flushing time at system shut-down, with or without booster pump

| | |
|---------------------------------------|--|
| Raw water rinsing time 2 min | High pressure p. during raw water rinsing off |
|---------------------------------------|--|

After the system has been switched off, the flushing valve (optional) opens for the preset flushing period to allow raw water flushing. This process flushes out the concentrate in the raw water end of the Dulcosmose® system. The inlet valve remains open.

Raw water flushing is normally carried out with the booster pump switched off. Depending on the system version, however, it may be necessary to flush the system with the booster pump switched on.

If the system has no flushing valve a so-called concentrate displacement can be carried out. This takes place when the booster pump is switched on.

3.3.14 Setting permeate flushing time

| |
|---|
| Permeate rinse rinse time 1 min |
|---|

In permeate flushing (optional), the raw water in the Dulcosmose® system is flushed out of the cleaning tank with permeate for a preset flushing time. The cleaning tank is refilled automatically at the next system start-up.

If the minimum level in the cleaning tank is reached during the permeate flushing the cleaning pump switches off. The warning message “Liquid level low” appears on the display. The message “Liquid level low” disappears after the conclusion of flushing. There is no failure message.

3.3.15 Cleaning pump for chemical cleaning

| |
|-------------------------------------|
| Cleaning pump present? no |
|-------------------------------------|

In small systems the booster pump can carry out the cleaning pump functions.

3.3.16 Setting maximum standing time

| |
|--------------------------------------|
| Maximum stand-by time 12 h |
|--------------------------------------|

Given activated level control or from the mode “Pause”, the Dulcosmose® system automatically resumes the interval operation time as soon as the maximum downtime is exceeded.

This automatic re-start reduces the potential bacterial proliferation which can occur while the system is standing, as well as biological fouling of the membrane elements.

This function is deactivated by setting the standing time to “0 h”.

3.3.17 Setting intermittent operation time

| |
|--|
| Interval operating time 20 min |
|--|

If liquid level-control is activated, the Dulcosmose® system automatically starts up for the intermittent operation period, once the maximum standing time has been exceeded and if the pause function has not been activated.

If the permeate level in the permeate storage tank exceeds the upper level during the intermittent operation period, the permeate valve (optional) opens. The overflow from the cleaning tank should be connected to the wastewater drain.

WARNING



The permeate storage tank can overflow during intermittent operation. Fit an adequate overflow to the permeate storage tank.

3.3.18 Setting analogue signal

Analog output
0 $\mu\text{S}/\text{cm}$ = 4 mA
1000 $\mu\text{S}/\text{cm}$ = 20 mA

For documentation purposes the permeate conductivity can be written to a recording device. The recorder is connected to the standard signal output on the controller.

You can choose between a standard 0 to 20 mA signal and a 4 to 20 mA signal:

| | |
|---------------|---|
| 0 and/or 4 mA | corresponds to 0 $\mu\text{S}/\text{cm}$ conductivity |
| 20 mA | can be allocated to any conductivity value. |

3.3.19 Pause function

Pause at
pause contact
closed

By opening and closing an external switch, which is connected to the pause input on the controller, the Dulcosmose® system can be switched on and off. You can choose whether the Dulcosmose® system is started up by opening or closing the pause switch. If the Dulcosmose® system is switched off via the pause switch, this can be followed by raw water or permeate flushing. If water pressures become too low, the system will automatically switch to permeate flushing.

3.3.20 Setting of minimum supply voltage

Minimum
supply voltage
78 %

In this menu, the minimum supply voltage tolerable by the control can be set.

| | |
|--------------------|--|
| Permissible range: | 78 - 108 % |
| Default setting: | 9 - 0 % |
| | 100 % correspond to 230 Volts or 24 Volt |

3.3.21 Setting of acknowledgement of supply voltage failures

Acknowledgement
supply voltage
failure
no

In this menu the setting can be made whether the error message "Supply voltage too low" has to be acknowledged (setting: yes) or not (setting: no). Default setting: no.

3.3.22 "Failure" signal input

An external failure detector, e.g. an excess pressure monitor, can be connected to the "Failure" input.

The input should be jumped if there is no external fault signal connected.

3.3.23 “Metering Pump” controller output

The “Metering pump” controller output is used to control a metering pump if dosing water-hardness stabilisers or other chemicals to the water entering the Dulcosmose® system.

BlN the 230 V 50/60 Hz version a metering pump can be connected directly to the controller. For the 24 V 50/60 Hz version this contact is configured with 24 V 50/60 Hz. In addition, both controller versions are fitted with a voltage-free contact.

3.3.24 Alarm relay

A fault-indicating device can be connected to the “Alarm” fault-indicating relay.

The relay closes (N/O) when the system is switched off or when a power failure or other type of failure occurs.

3.4 Chemical cleaning



WARNING

Observe the guidelines in the operating instructions manual and the technical documentation for the Dulcosmose® system as well as the safety data sheets for the chemicals used when carrying out chemical cleaning!

Press the CHANGE key to select the chemical cleaning window in order to initiate chemical cleaning.



Pressing the ENTER key starts the chemical cleaning.

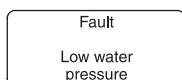
The cleaning pump starts, the permeate or flushing valve (optional) opens.

After sufficient time has elapsed for the chemicals to take effect, chemical cleaning is ended by pressing the STOP/START key for 2 seconds.

If a lower liquid level float switch is installed, the cleaning pump is protected against running when liquid levels are inadequate. If the lower float switch is not installed this contact should be jumped.

4 Troubleshooting

Failure message: water pressure too low



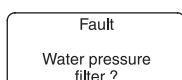
Cause
Remedy

After opening the inlet valve, the water pressure detected was too low.

► Remedy cause of low water pressure.

If the maximum number of attempts has not been exceeded, the Dulcosmose® system will automatically re-start once the water pressure has reached a sufficient level and when the waiting period has elapsed. The waiting time can be overridden by pressing the ENTER key. The system will then start up immediately.

Failure message: water pressure filter



Cause
Remedy

After opening the inlet valve, the water pressure detected was too low.

► Remedy cause of low water pressure.

NOTE

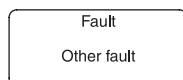
Confirm the failure by pressing the ENTER key.

NOTE

The cause of this fault is often a dirty pre-filter.

- Clean or replace the filter.

Failure message: other failure



Possible cause External failure detector triggered.

Remedy ► Remedy cause of failure.

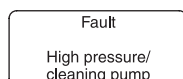
Possible cause There is no external failure detector connected and the contacts are not jumped.

Remedy ► Jump contacts.

NOTE

Having remedied the fault, the error message is to be acknowledged by pressing the ENTER key.

Failure message: booster pump, purification pump



Cause The motor contactor for the booster pump or cleaning pump has been actuated.

Remedy ► Remedy cause of failure (see operating instructions manual for booster pump).

NOTE

Confirm the failure by pressing the ENTER key.
Raw water or permeate flushing will not take place.

Failure message: free flushing time elapsed



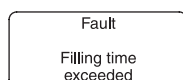
Cause The maximum free flushing time has elapsed and the conductivity still exceeds admissible levels.

Remedy ► Remedy cause of failure (see operating instructions manual for Dulcosmose® system).

NOTE

Confirm the failure by pressing the ENTER key.

Failure message: filling time exceeded



Cause The maximum filling time has elapsed and the cleaning tank has not been filled.

Remedy ► Remedy cause of failure (see operating instructions manual for Dulcosmose® system).

NOTE

Confirm the failure by pressing the ENTER key.

Failure message: temperature measurement

Fault
Temperature
too low

Fault
Temperature
too high

or

- Cause* Inaccurate temperature measurement.
- Remedy* ► Inspect temperature gauge.

NOTE

Confirm the failure by pressing the ENTER key.

Failure message: supply voltage less than 190 V

Fault
Supply voltage
too low

- Cause* The supply voltage is less than the minimum admissible supply voltage.
- Remedy* ► Inspect power supply.

NOTE

In the default setting (see 3.3.21), the system restarts automatically if the admissible minimum supply voltage is exceeded by 5 – 10 Volts.

Failure message: float switch

Fault
Level switch

- Cause* An inadmissible actuation of the float switch in the permeate tank was detected.
- Remedy* ► Replace float switch.
► Disconnect the controller from the power supply.

Failure message: memory failure

Fault
Memory error

- Cause* The controller has detected a fault in the memory during self-test.
- Remedy* ► Replace the controller (to be carried out by an electrical engineer only!).

NOTE

If the failure is triggered by a faulty float switch the failure message can be removed by replacing the float switch and switching the power off and on again.

Failure message: basic settings

Fault
Basic settings

- Cause* The controller has detected a fault during self-test.
The program resets to original (basic) settings.
- Remedy* ► Replace the controller (to be carried out by an electrical engineer only!).

Warning message: cleaning tank empty

Permeate rinse
low level tank
rinsing time
xx:xx min:sec

Cause Liquid levels have fallen below the lower limit during permeate flushing and chemical cleaning. The cleaning pump stops. There is no external failure message. In permeate flushing the message disappears after the flushing time has elapsed.

Remedy ► See operating instructions manual for Dulcosmose® system.
Inspect the filling process in the cleaning tank. If necessary, adjust the flushing time.

Warning message: water pressure too low

Warning
Low water
pressure
xx:xx min:sec

Cause The water pressure has dropped below the minimum admissible value at system start-up or during operation. The maximum number of start-up attempts has not yet been reached. There is no failure message at this point.

Remedy ► See section 5, Troubleshooting, "Troubleshooting: water pressure too low".

5 Assembly and Installation

The Dulcosmose® Controller can be wall or panel mounted. The robust plastic housing comprises upper and lower sections. The upper section houses a graphical display and transparent display window while the lower section contains the processor, power supply and options circuit boards. A ribbon cable connects the electronics to the display. The electrical leads are fed through cable apertures on the underside of the housing which are closed on delivery and broken open as required. A wall bracket is attached to the back of the housing for easy wall mounting.

The device has no mains switch. It is ready to operate as soon as it is connected to the power supply.

The devices correspond to the relevant requirements for electrical actuators and therefore comply with the following standards.

- Supply voltage in accordance with - DIN IEC 38
- Electrical safety in accordance with - EN 61010-1
- Electromagnetic interference transmission in accordance with - EN 55011 size 1/class A.

5.1 Safety guidelines

The device can be mounted only in a control panel or suitable upper housing (see accessories). The device may not be operated unless installed in this manner.

ATTENTION



- **Observe the generally applicable safety precautions when installing the device. Observe nationally applicable directives.**
- **Read the operating instructions manual through carefully before commencing installation and commissioning.**
- **Only specially trained and appropriately certified personnel may electrically install the device.**
- **The mains supply values given on the device must comply with the mains power supply.**
- **The power leads and data leads must not lie adjacent to leads which may transmit interference. Take necessary interference suppression precautions in such cases. Excessive interference can lead to defective functioning or even the destruction of the device.**

5.2 Mechanical assembly description

Please remove the protective film from the display.

5.2.1 Wall mounting

NOTE

Locate the device so that it is easy to see and operate (at eye level if possible).

The device can be screwed directly onto the wall by means of the wall bracket supplied (drilling template included).

Wall mounting fixtures:

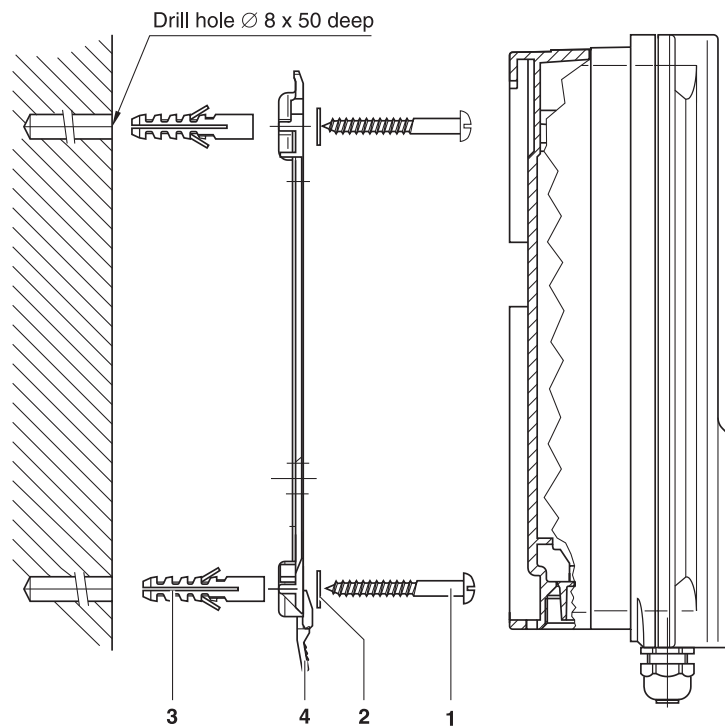
- Item (1) 3 off 5 x 45 round headed screws
- Item (2) 3 off 5.3 washers
- Item (3) 3 off plastic wall plugs

The wall bracket (4) can be used as a drilling aid. Align the bracket against the wall in the correct position.

NOTE

When aligning the device, allow sufficient room for attaching the cables and allow 120 mm above for the parking position.

- ▶ Mark the holes and drill.
- ▶ Push in wall plugs (3) and screw the bracket into place with the screws (1) and the washers (2).
- ▶ Place the device onto the bracket, exert light pressure against the wall and push upward approx. 4 mm until you hear a click.

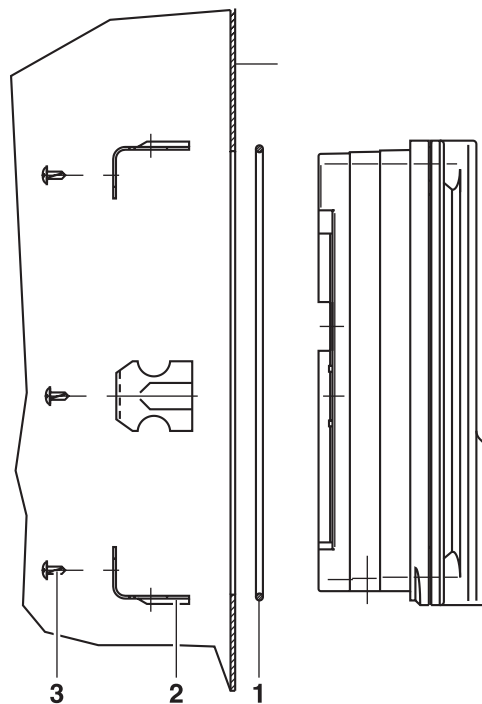


5.2.2 Control panel assembly

A 4 mm ridge which locates onto the control panel runs around the circumference of the housing. The ridge itself has a circumferential groove which holds a sealing profile. When panel mounting, the front section projects approx. 35 mm out of the control panel. The device is firstly located into a specially provided panel cut-out and is fastened in place from the inside using the fasteners provided.

Fixtures for panel mounting:

- Item (1) 1 off d3 foam rubber profile seal
- Item (2) 6 off steel holding bows, zinc plated
- Item (3) 6 off PT self-tapping screws, zinc plated



- Procedure*
- Use the drilling template to mark the exact position of the device on the control panel. This should be at eye level if possible. Ensure that there is sufficient space above for the "parking position".
 - Drill, 12-13 mm diameter.

NOTE

A photocopied drilling template will be a slightly different size to the original.

- Use a punch or hole saw to pierce out the cut-out according to the drawing. The control panel thickness should be 2-3 mm.
- Before inserting the device into the cut-out, push the profile seal evenly into the circumferential groove.
- Tension the controller with the control panel from the back using the holding bows and screws.

5.3 Electrical installation

ATTENTION



- Carry out electrical wiring only after installation in the control panel.
- The mains power must be disconnected when working with the power leads.

5.3.1 Electrical installation for wall-mounted device

Opening the device

ATTENTION

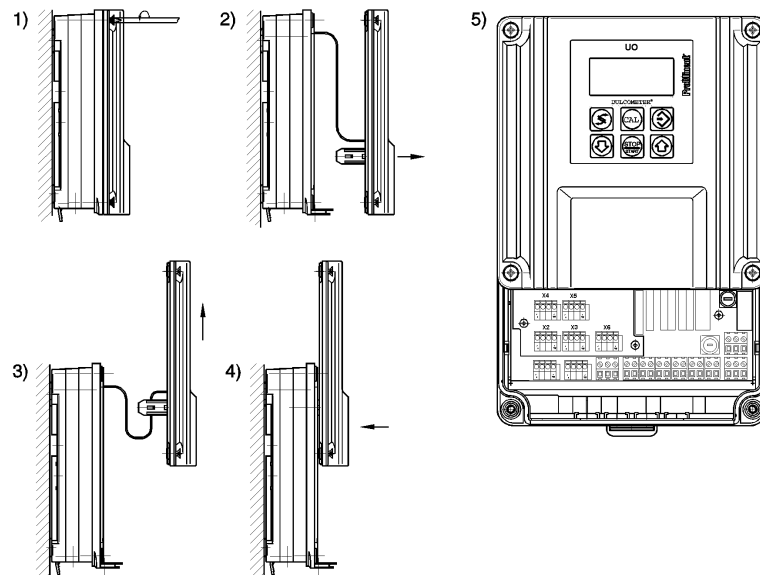


- The device should generally be opened by qualified personnel only.
- Before opening the device for servicing, ensure that the device is disconnected from the power supply and cannot be reactivated while open.

NOTE

The device should be opened only when mounted on a wall or in a control panel.

- Unfasten the four sunk-head screws to open the housing. The upper section is also secured to the lower section with a snap fastener.
- Pulling the upper section forward opens the housing. This will release the snap fastener.
- Place the upper section into the "parking position" (guide into the approx. 100 mm aperture). The fuse and all terminals are now easily accessible.



Breaking open cable apertures Firstly, break open the threaded apertures as required for the number of leads to be connected.

Use the correct tool.

The following tools are required:

- Back row (fig. 2): screwdriver DIN 5262-B, size 1 (Ø 4.5 mm)
- Front row (fig. 3): screwdriver DIN 5262-B, size 0 (Ø 3.0 mm)

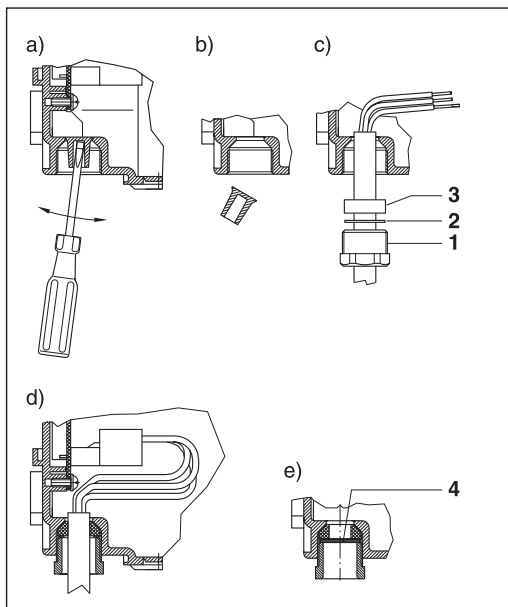


Fig. 2: Back row

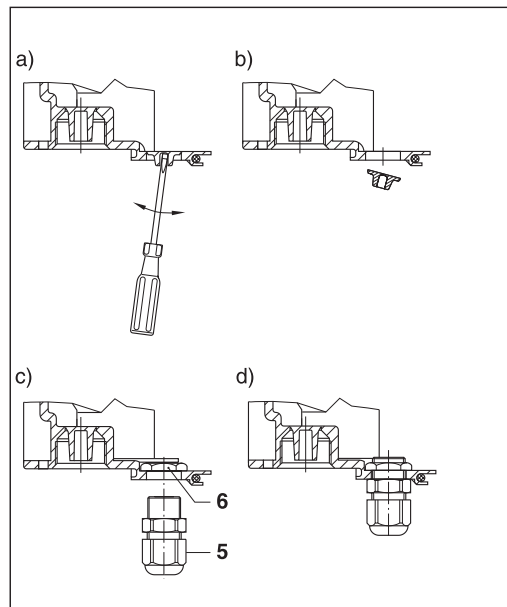


Fig. 3: Front row

- ▶ Strip sufficient sheathing from the lead (depending upon the location of the terminals). Push threaded connectors (1), collar (2) and seal (3) onto the lead and feed into the threaded cable aperture.
- ▶ Screw threaded connectors in place and tighten with SW 19 spanner. Shorten the core leads to the precise total length and strip 7 mm of insulation from each. Connect to the terminals according to the electrical wiring diagram.
- ▶ Use end crimps for core wires. Unused opened cable apertures can be closed using the PG 11 stoppers provided (4).

Cable connectors packing list

| Item | | | No. off |
|------|--------------------|---------------------------|---------|
| 1 | Threaded connector | PG 11 | 5 off |
| 2 | Collar | PG 11 | 5 off |
| 3 | Collar | PG 11 inner → 9 mm | 5 off |
| 3 | Collar | PG 11 inner → 7 mm | 3 off |
| 3 | Collar | PG 11 inner → 5 mm | 3 off |
| 3 | Collar | PG 11 inner → 4 mm | 2 off |
| 3 | Collar | PG 11 2 x → 5 mm | 5 off |
| 3 | Collar | PG 11 2 x → 4 mm | 2 off |
| 4 | Washer | PG 11 | 3 off |
| 5 | Threaded connector | PG 7 | 4 off |
| 6 | Nut | PG 7 brass, nickel-plated | 4 off |

The four additional apertures in the front row can be used for PG 7 threaded connectors. Cable connectors can be any commercially available PG 7 threaded connector (compatible with enclosure rating IP 65) with nuts (brass, nickel-plated).

Available from ProMinent:

| | |
|---|---------------------|
| 1 off black PG 7 threaded cable connector | Order number 703896 |
| 1 off PG 7 nut, brass, nickel plated | Order number 703819 |

- Insert PG 7 nut (6) into the inside and attached PG 7 threaded connector (5) from the outside. Tighten: (SW15)

5.3.2 Electrical installation for panel-mounted device

Generally only the back row of threaded connectors are used in the panel mounted version electrical installation. The front row (PG 7 apertures) is located outside the control panel. The threaded cable connectors supplied are not required for the panel mounted version. The individual cores (no strain relief or seals) are inserted straight through the holes and attached to the terminals according to the electrical wiring diagram. Break open the apertures as described in 5.3.1.

5.3.3 Notes on current carrying capacity of switching outputs

Maximum current carrying capacity of switching outputs:

| Output | Description | Current carrying capacity of 230 Volt version | Current carrying capacity of 24 Volt version |
|--------|--------------------|---|--|
| XR1 | High pressure pump | max. 1.1 kW | max. 25 VA |
| XR2 | Cleaning pump | max. 100 VA | max. 25 VA |
| XR3 | Inlet valve | max. 100 VA | max. 25 VA |
| XR4 | Permeate valve | max. 100 VA | max. 25 VA |
| XR5 | Flushing valve | max. 100 VA | max. 25 VA |
| XR6 | Metering pump | max. 100 VA | max. 25 VA |
| XR7 | Alarm relay | max. 100 VA | max. 25 VA |

230 Volt version:

Together, the switching capacities of the outputs XR2 to XR6 must not exceed the value of 230 VA. These outputs are protected by a 1.6 A fuse.

A motor protection switch must be connected to operate a 1-phase high pressure pump up to max. 1.1 kW (switching output XR1). A motor starter combination (contactor with motor protection switch) must be used at switching capacities greater than 1.1 kW or when using 3-phase motors.

24 Volt version:

Together, the switching capacities of the outputs XR1 to XR6 must not exceed the value of 150 VA. A high pressure pump can be activated via a motor starter combination.

6 Technical Data

Temperature information

| | |
|---------------------------------|----------------|
| Admissible ambient temperature: | -5 °C...40 °C |
| Admissible storage temperature: | -10 °C...70 °C |

Materials information / chemical resistance

| | |
|------------------------|--|
| Part | Material |
| Housing: | Luranyl PPE-GF 10 |
| Keypad: | Polyester film, PET |
| Housing seal: | Foam rubber, CR |
| Outer sealing profile: | Foam rubber, CR |
| Holding bows: | Zinc electroplated steel |
| M5 screws: | A2 |
| Chemical resistance: | The device is resistant to normal atmospheres in technical rooms |

Measurements and weights

| | |
|----------------------------|---|
| Housing: | 198 x 200 x 76 (W x H x D) |
| Panel mounting projection: | 35 mm outwards, 38 mm inwards |
| Device weight: | Without packaging approx. 1.2 kg With packaging approx. 2.0 kg |

Electrical data, 230 V version

| | |
|---|--|
| Nominal voltage: | 230 V~, 50/60 Hz |
| Max. current consumption (electronics): | 80 mA at 230 V |
| Electronic fuse protection: | 5 x 20 mm fine fuse 160 mA, 250 V slow (no. 712048) |
| Relay fuse protection: | 5 x 20 mm fine fuse 1.6 A, 250 V slow (no. 712024) |

Electrical data, 24 V version

| | |
|-----------------------------|---|
| Nominal voltage: | 24 V~, 50/60 Hz (for use with extra low voltage) |
| Electronic fuse protection: | 5 x 20 mm fine fuse 0.8 A, 250 V slow (no. 712022) |

Conductive conductivity input

| | |
|--------------------|--|
| Probe: | 2-wire, 2-electrode sensor |
| Measurement range: | 200, 2000 µS/cm |
| Measurement span: | 1 : 100 |
| Cell constant: | 0.01...10 depending upon measurement range |
| Probe controller: | 100 Hz, sine form |

Pt 100 input

| | |
|------------------|---------------|
| Input range: | 0 °C...100 °C |
| Reproducibility: | ±0.5 °C |
| Resolution: | 0.1 °C |

Digital inputs

| | |
|----------------------|---|
| Reference potential: | Joint reference potential in themselves, however, electrically isolated from other in/outputs |
| Insulation voltage: | 500 V |

Standart mA signal output

| | |
|----------------------|--|
| Reference potential: | Electrically isolated from other in/outputs |
| Insulation voltage: | 500 V |
| Output range: | 0/4...20 mA (programmable) |
| Maximum resistance: | 600 Ω |
| Reproducibility: | 0.5 % of output range in relation to displayed value |

Switch output, semiconductor relay X7, metering pump actuating function

| | |
|---------------|----------------------------------|
| Contact mode: | N/O with varistor trigger |
| Max. load: | 25 V peak, 100 mA switch current |

Power relay output, XR1

| | |
|-------------------------|-------------------------------------|
| Contact mode: | N/O with varistor trigger |
| Max. load: | 230 V~, 1.1 kW 24 V~, 25 VA |
| Contact operating life: | >20 x 10 ³ switch cycles |

Power relay output, XR2-XR6

| | |
|-------------------------|-------------------------------------|
| Contact mode: | N/O with varistor trigger |
| Max. load: | 230 V~, 100 VA 24 V~, 25 VA |
| Contact operating life: | >20 x 10 ³ switch cycles |

Power relay output, XR7, alarm fault indicating relay

| | |
|-------------------------|-------------------------------------|
| Contact mode: | Changeover with varistor trigger |
| Max. load: | 230 V~, 100 VA 24 V~, 25 VA |
| Contact operating life: | >20 x 10 ³ switch cycles |

7 Maintenance and Repair

7.1 Safety

Before commencing maintenance tasks, ensure that the device/system is disconnected from the power supply. The Dulcosmose® Controller has no on/off switch. The power supply must therefore be interrupted via an external main switch or via the main fuse. Otherwise, general safety guidelines apply.

Terminals XR7 1-3 may still be live, even if the supply voltage has been switched off.

ATTENTION



- Fuse must be replaced by a corresponding original part only.
- Use a 5 x 20 mm fine fuse.
- Fuse value at 230 V mains voltage: 0.160 A slow, order number 712048
- Fuse value at 24 V mains voltage: 0.800 A slow, order number 712022
- Fuse for protecting XR2–XR6 relays in 230 Volt version: 1.6 A slow-blow, order number 712024

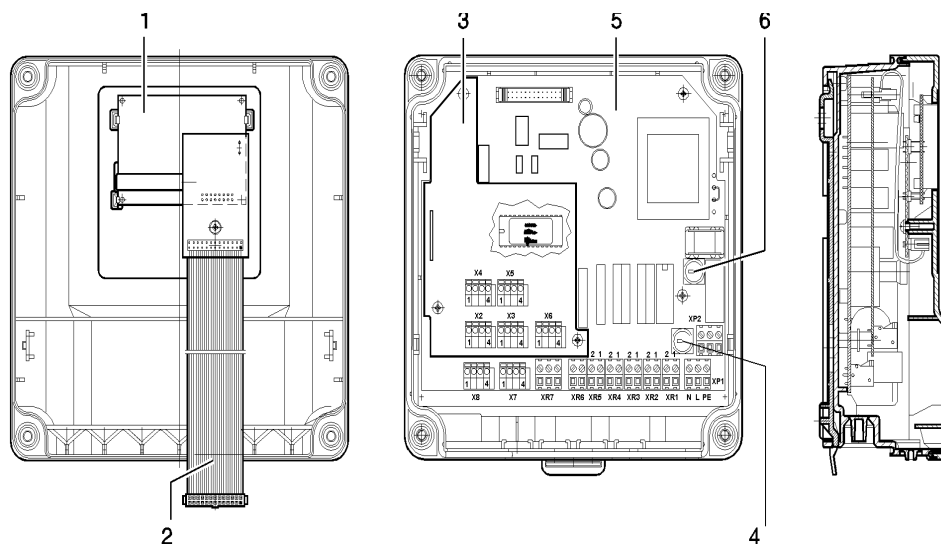
Changing a fuse

- Observe safety guidelines mentioned above before changing a device fuse (disconnect from the power supply). The mains and relay fuses are both housed in closed fuse holders (6) and (4) respectively. The relay fuse is located near the terminals.
- Open the device and place in the parking position.
- Unfasten the bayonet fitting in the fuse holder.
- Remove the fuse and replace with a new fuse.
- Re-engage the bayonet fitting and close the housing.

Inside upper housing section

Inside lower housing section

Side view in section



- 1 Electrical display componentry
- 2 Ribbon cable
- 3 I/O/S electrical componentry
- 4 Relay fuse holder (in 230 Volt version only)
- 5 Electrical componentry processor
- 6 Mains fuse holder

8 Enclosure ratings/Standards

8.1 Contact and moisture protection (IP)

Device when housing closed: enclosure rating IP 65 according to DIN VDE 0470 corresponding to EN 60529 and IEC 529.

Outer seal (panel mounted device): enclosure rating IP 54 according to DIN VDE 0470 corresponding to EN 60529 and IEC 529.

8.2 Electrotechnical safety/radio protection

EC low voltage directive (73/23/EEC) i.d.F. 93/44/EEC

EC-EMV directive (89/336/EEC) i.d.F. 92/31 EEC

Supply voltage according to DIN IEC 38

Electrical safety according to EN 61010-1

Electromagnetic interference transmission according to EN 55011 size 1/ class B

Interference resistance according to IEC 801-2, -3, -4 and/or DIN VDE 0843, part 2, part 3, part 4 or EN 500823-2

EN 60335-1 Safety of electrical devices for domestic use

EN 50081-1 EMV, interference transmissions in residential areas

EN 50082-2 EMV, interference resistance in industrial areas

EN 60555-2 EMV feedback in power supply networks, harmonic oscillations

EN 60555-3 EMV feedback in power supply networks, voltage fluctuations

8.3 Requirements in damp/changeable climates

Damp/changeable climate according to FW DIN 50016

9 Spare parts/Accessories

| | |
|--|----------------------|
| • Assembly set for control panel mounting | Order number 792908 |
| • Electronics safety fuse, 240 VAC, 0.160 A slow | Order number 712048 |
| • Electronics safety fuse, 24 VAC, 0.80 A slow | Order number 712022 |
| • Fuse 1.6 A slow-blow, for protecting relays in 230 Volt version | Order number 712024 |
| • Conductivity sensor LF 1FE | Order number 741152 |
| • Conductivity sensor LFT 1FE with Pt 100 | Order number 1001374 |

10 Disposal of used parts

Plastic and electronic waste is special waste and must be recycled accordingly.

Dispose of used parts in the municipal collection points in your region or municipality or return to ProMinent branches.

The device construction comprises, with the exception of the electrical componentry, few mechanical parts. These can be separated into types fairly simply, e.g. there are no metal threaded parts in the housing. With the exception of the keyboard, these parts can be fed back into the materials cycle (see section 6, Materials information).

The keyboard is to be graded and disposed of in accordance with municipal directives.

Pre-settings

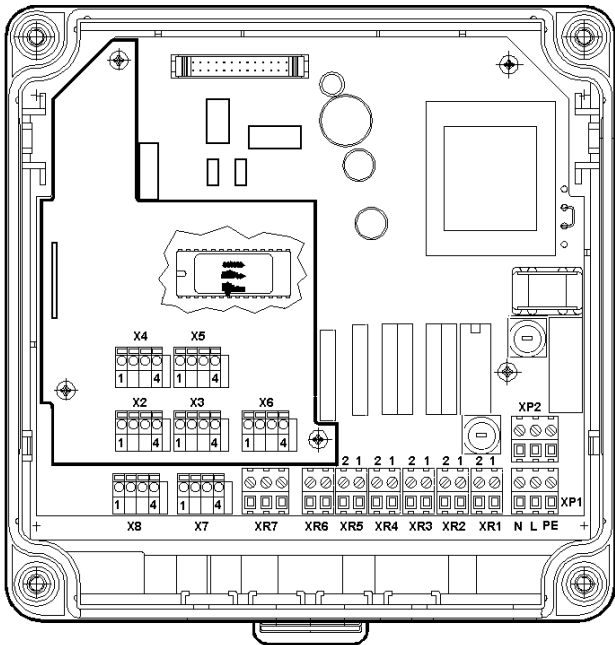
Comment:

*Those values marked with a * are present during the production of the controller.*

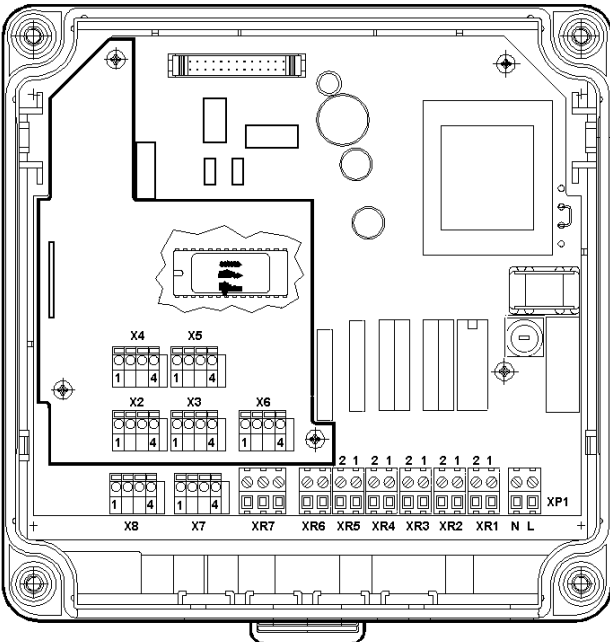
| | | |
|--|---|------------------------------|
| Access code: | <input type="checkbox"/> 5000 * | |
| | <input type="checkbox"/> | Range 0 - 9999 |
| Language: | <input type="checkbox"/> German * | |
| | <input type="checkbox"/> English | |
| | <input type="checkbox"/> French | |
| | <input type="checkbox"/> Spanish | |
| | <input type="checkbox"/> | |
| Liquid level control | | |
| Permeate tank: | <input type="checkbox"/> Off * | |
| | <input type="checkbox"/> On | |
| Cell constant; conductivity probe: | <input type="checkbox"/> 1 * | |
| | <input type="checkbox"/> | Range 0.09 - 11.00 |
| Pt 100 present: | <input type="checkbox"/> Yes * | |
| | <input type="checkbox"/> No | |
| | Permeate temperature °C | Range 1 - 70 °C |
| C-factor | | |
| conductivity measurement: | <input type="checkbox"/> 1 % / Kelvin * | |
| | <input type="checkbox"/> % / Kelvin | Range 0.01 - 3.00 % / Kelvin |
| Maximum conductivity: | <input type="checkbox"/> 150 µS/cm * | |
| | <input type="checkbox"/> µS/cm | Range 5 - 1500 µS/cm |
| Waiting time when water level is low: | <input type="checkbox"/> 5 min * | |
| | <input type="checkbox"/> min | Range 1 - 15 min |
| Maximum attempts when water level is low: | <input type="checkbox"/> 3 times * | |
| | <input type="checkbox"/> times | Range 0 - 10 attempts |
| Flushing time, system start-up: | <input type="checkbox"/> 1 min * | |
| | <input type="checkbox"/> min | Range 0 - 10 min |

| | | |
|---|--|---------------------------|
| Start-up time; booster pump: | <input type="checkbox"/> 5 sec * | |
| | <input type="checkbox"/> sec | Range 1 - 30 sec |
| Maximum free flushing time: | <input type="checkbox"/> 5 min * | |
| | <input type="checkbox"/> min | Range 0 - 15 min |
| Maximum filling time purification tank: | <input type="checkbox"/> 20 min * | |
| | <input type="checkbox"/> min | Range 0 - 90 min |
| Flushing during operation, flushing time: | <input type="checkbox"/> 2 min * | |
| | <input type="checkbox"/> min | Range 0 - 15 min |
| Flushing during operation, each: | <input type="checkbox"/> 0 h * | |
| | <input type="checkbox"/> h | Range 0 - 24 h |
| Raw water flushing, flushing time: | <input type="checkbox"/> 2 min * | |
| | <input type="checkbox"/> min | Range 0 - 15 min |
| Booster pump during raw water flushing: | <input type="checkbox"/> Off * | |
| | <input type="checkbox"/> On | |
| Flushing time, permeate flushing: | <input type="checkbox"/> 1 min * | |
| | <input type="checkbox"/> min | Range 0 - 15 min |
| Cleaning pump present: | <input type="checkbox"/> No * | |
| | <input type="checkbox"/> Yes | |
| Maximum standing time: | <input type="checkbox"/> 12 h * | |
| | <input type="checkbox"/> h | Range 0 - 48 h |
| Intermittent operation time: | <input type="checkbox"/> 20 min * | |
| | <input type="checkbox"/> min | Range 0 - 99 min |
| Analogue output: | <input type="checkbox"/> 0 μ S/cm = 0 mA * | |
| | <input type="checkbox"/> 0 μ S/cm = 4 mA | |
| | <input type="checkbox"/> 1000 μ S/cm = 20 mA * | |
| | <input type="checkbox"/> μ S/cm = 20 mA | Range 5 - 1500 μ S/cm |
| Pause when pause contact: | <input type="checkbox"/> Closed * | |
| | <input type="checkbox"/> Open | |
| Minimum supply voltage: | <input type="checkbox"/> 90 %* | |
| | <input type="checkbox"/> ... % | |
| Acknowledgement | | |
| Supply voltage failure: | <input type="checkbox"/> no * | |
| | <input type="checkbox"/> yes | |

Terminal configuration, 230 volt-version (No. 1004192):



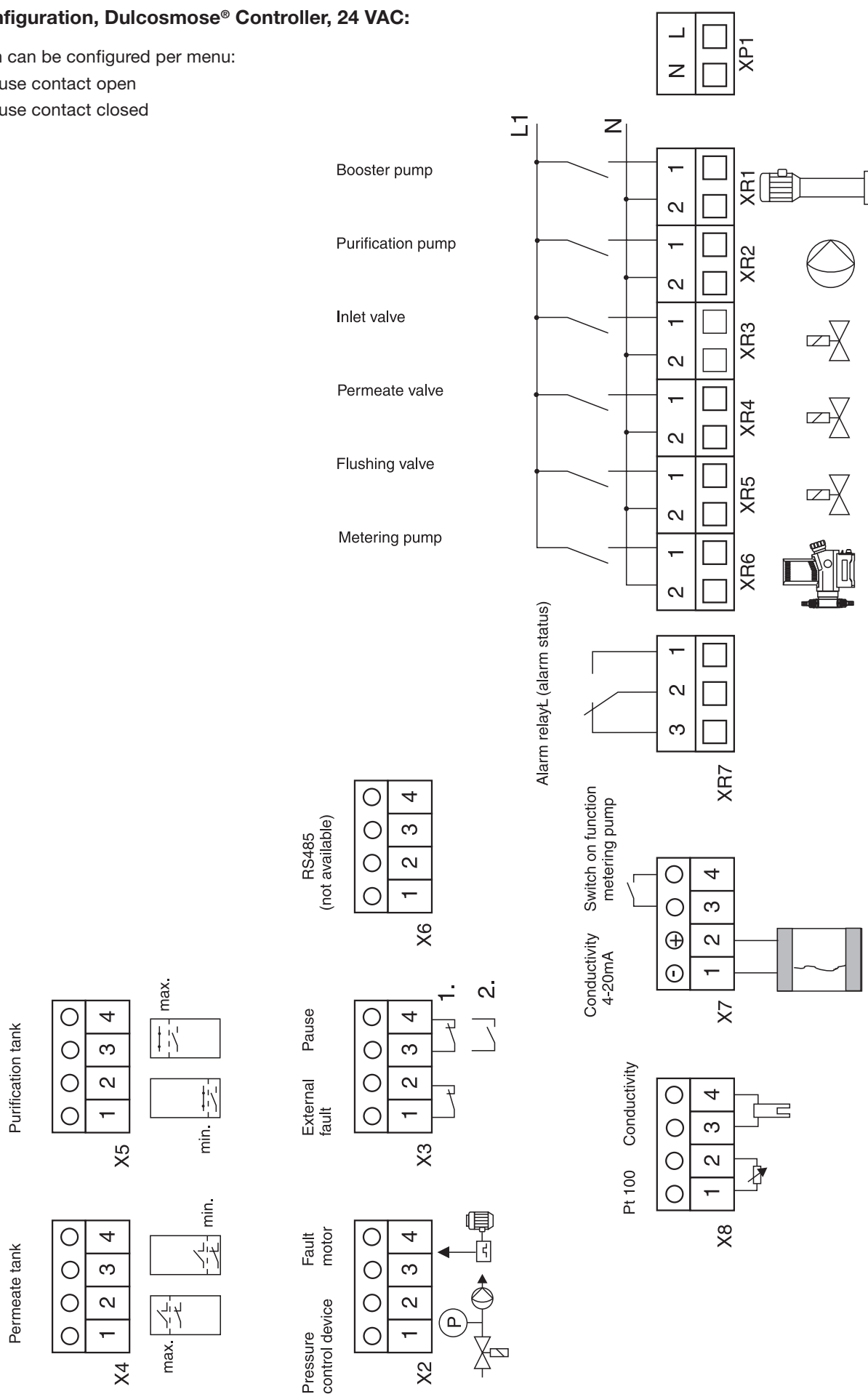
Terminal configuration, 24 volt-version (No. 1005082):



Terminal configuration, Dulcosmose® Controller, 24 VAC:

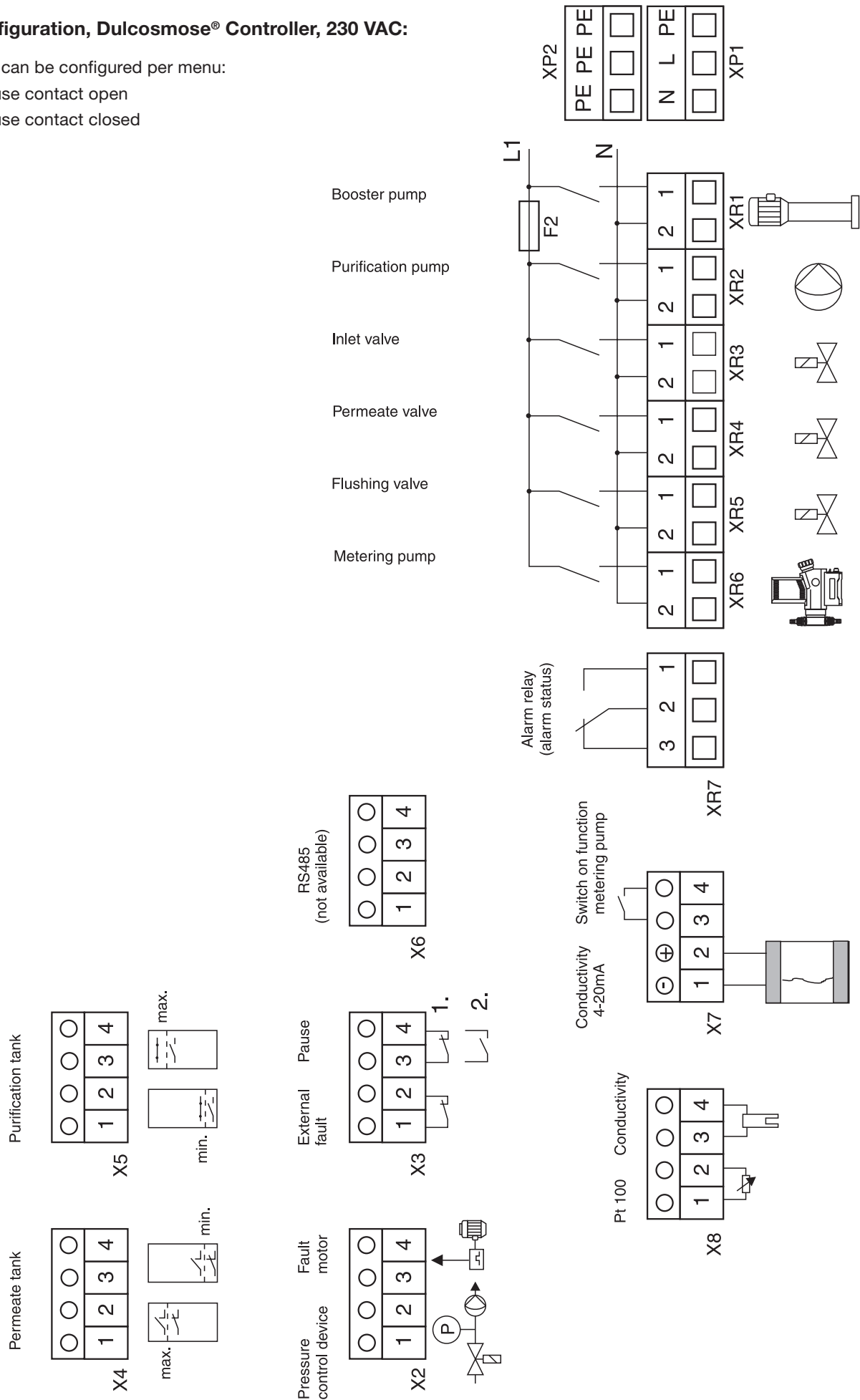
Pause function can be configured per menu:

1. Pause at pause contact open
2. Pause at pause contact closed

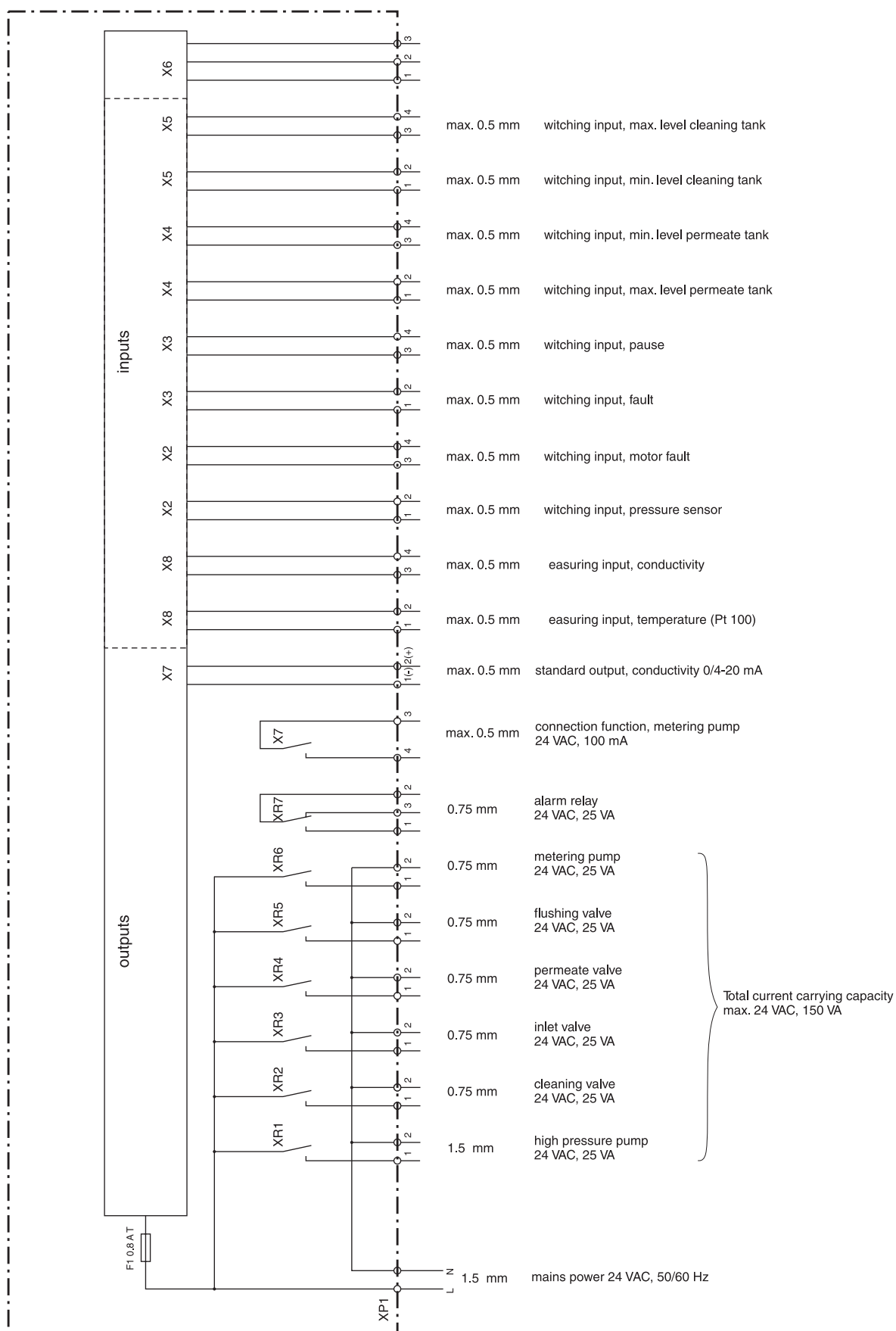


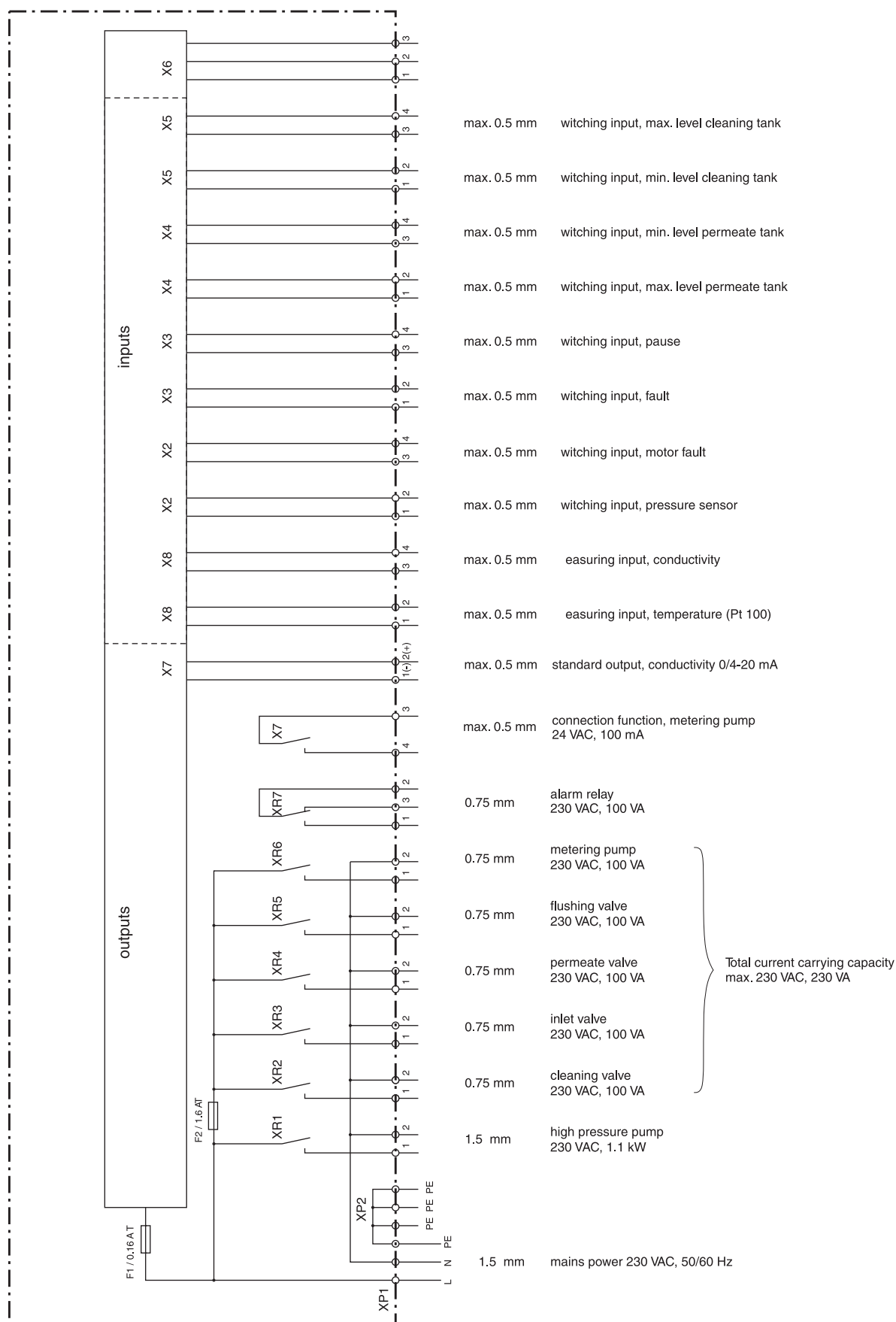
Terminal configuration, Dulcosmose® Controller, 230 VAC:

Pause function can be configured per menu:
1. Pause at pause contact open
2. Pause at pause contact closed



Wiring diagram, Dulcosmose® Controller, 24 VAC, 50/60 Hz (order no. 1005082)



ProMinent®

Switch inputs, Dulcosmose® Controller:

| Terminal | Switch input | Type | Input open | Input closed |
|----------|---------------------------------------|------|----------------------------|----------------------------|
| X2/1,2 | Pressure control device | N/C | Pressure too low | Pressure OK |
| X2/3,4 | Fault, motor | N/C | Motor fault | Motor in order |
| X3/1,2 | Fault | N/C | Fault activated | No fault |
| X3/3,4 | Pause | | | |
| | Menu: pause when pause contact open | N/C | Pause activated | Pause not activated |
| | Menu: pause when pause contact closed | N/O | Pause not activated | Pause activated |
| X4/1,2 | Max. level, Permeate tank | | | |
| | Menu: level control „on“ | N/C | Tank full | Level below max. threshold |
| | Menu: level control „off“ | | No effect | No effect |
| X4/3,4 | Min. level, Permeate tank | | | |
| | Menu: level control „on“ | N/C | Level above min. threshold | Behälter leer |
| | Menu: level control „off“ | | No effect | No effect |
| X5/1,2 | Min. level, Purification tank | N/O | Tank empty | Level above min. threshold |
| X5/3,4 | Max. level, Purification tank | N/O | Level below max. threshold | Tank full |

Switch inputs, Dulcosmose® Controller:

| Terminal | Switch input | Type | Input open | Input closed |
|----------|-------------------------------------|------|--------------|--------------|
| XR 1/1,2 | Booster pump | N/O | Pump off | Pump on |
| XR2/1,2 | Purification pump | N/O | Pump off | Pump on |
| XR3/1,2 | Inlet valve | N/O | Valve closed | Valve open |
| XR4/1,2 | Permeate valve | N/O | Valve closed | Valve open |
| XR5/1,2 | Flushing valve | N/O | Valve closed | Valve open |
| XR6/1,2 | Metering pump | N/O | Pump off | Pump on |
| XR7/3,4 | Switch on function Metering pump | N/O | Pump off | Pump on |

Alarm output, Dulcosmose® Controller:

| Terminal | Switch input | Type | Input 2,3 open | Input 2,3 closed |
|-----------|------------------------------|------------|----------------|------------------|
| XR7/1,2,3 | Alarm fault indicating relay | Changeover | No alarm | Alarm |